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ABSTRACT

A course was designed to teach the use of learning principles in the development of teaching materials reflecting the best in the present state of the "theory of instruction." Based on Keller's Personalized Instruction System, the course aimed to establish in students a working knowledge of behavioral principles, the ability to discriminate among a broad range of educational materials teaching widely different learning tasks, and the ability to produce educational materials. There are 34 units in the course, designed for self-paced instruction. The course went through three trails, the first two with curriculum specialists and graduate students in education and the final trail--hands-off field test--with 46 undergraduates at Emerson College. The evaluation of the course consisted principally in criterion questions administered as a pretest and as a posttest. The percent gain was in all instances high, but with the undergraduates the final scores were not completely satisfactory, a fact attributed to the lack of monitoring. The material should produce competence in critical judgement and production of curriculum materials for graduate students. (WH)

The Use of Learning Principles in Instruction

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We have designed a course to teach the use of learning principles in the development of teaching materials reflecting the best in the present state of the "theory of instruction." The course aimed to established in the students: 1) a working knowledge of behavioral principles and how they contribute to the development of good educational materials, 2) a discriminative repertoire which enables him to evaluate a broad range of educational materials teaching widely different learning tasks and, 3) an ability to produce educational materials reflecting his knowledge of the principles and his discriminative skills. While the principles and techniques are best exemplified in programmed instruction and individualized instruction, the course set out to prepare students to use these principles in any teaching form or medium including standard classroom settings, open education settings, films and television, educational games as well as programmed instruction and individualized instruction. Students examine such diverse curriculum materials as Sesame Street, a procedure to get children generating poetry described in Wishes, Lies and Dreams, Itard's procedure in training the Wild Boy of Aveyron, as well as more conventional programs.

The course is based on a number of assumptions about the nature of the technology of teaching.

1. Modern curriculum development is an applied science and as such,

the practitioner must understand the fundamentals of the science which is applied. In this instance, the sciences applied are basic learning principles as exemplified in the analysis of operant behavior and the science of test and measurement for use in individualized or adaptive materials.

2. Specific "models" of instruction are too limiting. There are numerous specific "models" which can serve as the basis of short courses in program development. These models, however, are particular codifications of underlying principles as they apply in a special domain. They are by their nature restrictive. This course concentrates on the process of educational design rather than on specific models for programs which operate more like cookbook recipes than like a system based on the application of fundamental wide-ranging principles.

3. Experience with a variety of materials in a variety of contexts is necessary for one to abstract the useful principles. For this reason, a variety of educational materials are critically examined by the student to establish good discrimination skills in determining whether or not the material follows the principles of the theory of instruction.

4. To be most useful, the course should be as close to self-instructional and as easy as possible to pass on to others in other training situations.

The course consists of 34 units styled after Keller's Personalized Instruction System. In a typical unit, the student receives a folder containing problems or questions and some source materials. Sources may be reprints of articles for the didactic portions of the course or samples of curriculum materials for discrimination and production exercises. They may be either printed materials, films, or tape recordings

depending on the nature of the particular unit. The student reads the questions and has the option of answering them immediately if he feels prepared. Most often, however, after reading the questions, he proceeds to use the source material in the manner prescribed. On completing the unit, he goes to a course monitor who examines his answers, discusses them with him and determines if he mastered the unit. If the student has not mastered the unit, he returns to the material to try again to attain mastery. It should be pointed out that the answers are often fairly extensive, not just one-word answers. Often there is no single correct answer but several reasonable alternatives.

The first section of the course provides a general overview including some of the original writings on programmed instruction, Individually Prescribed Instruction (IPI), Keller's Personalized Instruction, and contingency management. The overview serves first to provide the critical principles that will be reflected in all good curriculum materials, and second, to give the rationale for looking at basic fundamental learning principles. The second major section, consisting of several units, teaches the student fundamental behavioral principles. He is next introduced to the analysis of behavioral objectives and learning hierarchies and then goes on to the major portion of the course in which he examines a wide variety of different materials. In this portion of the course, discriminative and productive skills are established. After Unit 17 the students write their own curriculum units, perform editorial critiques of each other's material, and receive editorial critiques from course instructors.

The program has been through three cycles of test and revision. The first try-out was with a group of special students all of whom took the course in a special six week institute. All these students already

were employed in jobs with some form of curriculum development responsibility. They were all either from LRDC, RBS, or the State Board of Education. This constituted the target population - persons with a definite commitment to prepare materials but lacking training in the technology.

The first try-out was with a group of ten students during the summer and fall of 1971. A revision of the program was undertaken to improve the material based on this data.

After the material was revised, the course was offered for graduate credit in the Educational Psychology Department in the summer session of 1973. Sixteen students participated. They included two elementary school teachers, two high school teachers, a high school principal, two graduate students in education, and nine curriculum developers at LRDC. There were four sources of evaluation data: the students' responses on the units, pretest and posttest results, a questionnaire completed by the students, and the students' curriculum material.

The final test was a hands-off field test. Our confidence was such that we tried it with 46 undergraduates at Emerson College in Boston. Two faculty members had the requisite backgrounds and were interested in using it. Because the enrollment was much larger than expected the instructors dropped the production portions of the course and did not regularly monitor student answers to provide the critical feedback and recycling required.

An important component of the criterion for mastery of the course objectives was a set of questions which served as a pretest and as a post-test. Questions measured the three main objectives: 1) to articulate behavior and testing principles, 2) to discriminate good from poor be-

havioral objectives and, 3) to product samples of curriculum reflecting knowledge of the principles and their discriminative skills. For the first two try-outs using graduate students and practicing curriculum developers, overall pretest scores were 53% and 34%, while posttest scores were 83% and 61%. Gain scores were analyzed with non-parametric techniques for the entire test, for subdivisions of the test reflecting the three objectives and for each of the seven questions. Increases from pretest to posttest were reliable for ten of these eleven measures. Only one question did not show an increase. The pretest-posttest data were supplemented by a questionnaire which measured student affect and attitude at the end of the course. Responses to fourteen of the fifteen questions indicated that the students agreed that they had increased their competence, had little trouble with the units, and enjoyed the course.

The students' curriculum materials were, on the whole, well-thought out and creative. The wide range of topics and techniques indicated the variety of applications of the learning principles made by the students. The projects included a board game to teach circulation of the blood, a program on Black history, a backward chaining procedure to teach English composition, a procedure to use brush painting as a reinforcer for other classroom activities and a game to review principles of behavior modification.

The "hands-off" test with undergraduates resulted in a median pretest score of only 6% correct and a posttest median of 52%. Although the gain is clearly sizable, the field test was rather disappointing. Proper use of this material should, we feel, have produced much better performance. The lack of monitoring, an extremely important function, probably explains the disappointing performance more than any other factor. Students

complained of this in their course evaluation comments.

Even with a less than totally successful hand-off test these materials produce a considerable competence in graduate level students for critical judgment and production of curriculum materials which reflect the best of laboratory learning principles. We hope that this course will fill the need for short term training for those who prepare such materials.